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**Measurement of Direct Photons with the EMCal
in $\sqrt{s_{NN}} = 200$ GeV Au+Au Collisions at RHIC-PHENIX**

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Since photons do not interact strongly, direct photons are a powerful probe to study the initial state of matter produced from relativistic heavy ion collisions. They are emitted from all the states such as the initial state where prompt photon production can be described by pQCD, the Quark-Gluon Plasma (QGP) as thermal emission, and the final hadron-gas state. In addition, high- p_T photons caused by the interaction of hard-scattered jet partons with dense matter are expected to be produced. PHENIX recorded a high-statistics Au+Au data set in the 2004 Run. The new data set allows us to measure direct photons with the PHENIX electromagnetic calorimeter (EMCal) beyond $p_T=10$ GeV/ c and also at intermediate p_T where thermal photons and photons from jet-plasma interactions are important. We present a systematic study of direct photon measurement in ultra-relativistic high energy Au+Au collisions.

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